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OFFGASSING OF NON-METALLIC MATERIALS
IN 5 PSIA OXYGEN

By F. T. Wells and D. R. Hamilton
Astronautics Laboratory

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*George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama*

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16. ABSTRACT <p>Offgas analyses results of non-metallic materials to determine their conformance with MSFC-SPEC-101B, "Flammability, Odor, and Offgassing Requirements and Test Procedures for Materials in Environments Which Support Combustion," are reported. This report contains results obtained since early 1969 to the present time. Only results of Test No. 7 of MSFC-SPEC-101B are shown in this report. A brief test and analysis description including procedure development is also presented.</p>			
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OFFGASSING OF NON-METALLIC MATERIALS IN 5.0 PSIA OXYGEN

SUMMARY

Analysis results of a wide variety of non-metallic materials for offgassing products, including carbon monoxide and total hydrocarbons in 5 psia oxygen are reported. A general method as described in MSFC-SPEC-101B was used for the tests. This method is entitled "Flammability, Odor, and Offgassing Requirements and Test Procedures for Materials in Environments Which Support Combustion."

INTRODUCTION

The Saturn Workshop atmosphere is essentially a closed loop type. It has, therefore, been necessary to screen all non-metallic materials to determine their toxicity effect when exposed to 5 psia oxygen atmosphere environment planned for the Workshop. Offgas products of recommended materials for use in a habitation environment should not exceed 25 micrograms per gram of sample carbon monoxide and 100 micrograms per gram of sample total hydrocarbons (as pentane) when tested in accordance with MSFC-SPEC-101B.

The object of this report is to provide the results of three years testing of various non-metallic materials as generally described in MSFC-SPEC-101B and to show test procedures used. No use recommendations are noted in this report although it can be useful in guidance of design engineers and others for selection of the least toxic materials to be included in the Workshop design. It can be determined from Table I those materials which meet the toxicity requirements of MSFC-SPEC-101B, that is, those which offgas less than 25 micrograms per gram of sample of carbon monoxide and less than 100 micrograms per gram of sample of total hydrocarbons, as pentane.

TEST METHODS

Sample Testing in 5 psia Oxygen

Most of the data presented are based on weight of the sample before testing. Some of the data are based on surface area exposure where sample weight could not be determined because of bonding of the test material to metal plates as received for testing. An ideal

sample weight of about 20 grams was desirable to conform with the specification of 5 grams \pm 0.25 gram per liter in MSFC-SPEC-101B for the 4.2 liter test chambers. A surface area of 46.5 \pm 2.5 square inches per liter was used where possible to conform with the specification value per liter of test chamber. The samples were sealed in the test chambers equipped with bellows valves, evacuated with a mechanical pump and backfilled to 5 psia with pure oxygen. The chambers were then placed in an oven at 155°F for a 72 hour test heating period.

Analysis of Test Gases

Both carbon monoxide and total hydrocarbon analyses of the test container gases were made by chromatographic flame ionization methods. The carbon monoxide method used was a well established one where the carbon monoxide was catalyzed to methane by a nickel catalyst at elevated temperature and then analyzed by flame ionization.

Initial total hydrocarbon analyses were made by Porapak Q chromatographic column separation of individual components followed by flame ionization detection. Since column materials of all types show selectivity in separation or elution of various materials, error can result in use of a single column type for separation of infinite organic compound types as can be the case of offgas analyses. Certain compounds will not elute from the column or require lengthy time periods for elution. A method was developed using an unpacked 44 inch column so that hydrocarbon components would all elute simultaneously in a short elution time. The flame air flow and helium carrier gas flow was adjusted so that background output was not excessively high or that sensitivity was not lowered appreciably. Use of this procedure reduced analysis time from about 30 minutes to about 5 minutes. Detailed test and analytical procedures are described in MSFC-SPEC-101B; therefore, the procedure discussion will be limited in this report.

TEST RESULTS AND DISCUSSION

The results obtained by the test procedures as outlined above and generally outlined in MSFC-SPEC-101B are tabulated in Table I. As previously noted, the tests were in general made using 20 gram samples or 196 square inches of surface area to conform to sample size as noted in MSFC-SPEC-101B. The results are tabulated as micrograms per gram of sample on samples where a weight could be made. In the case of coatings, paints and that type of material, the results are reported as micrograms of carbon monoxide or total

hydrocarbons per 196 square inches. Where sample weights or surface area measurements were not applicable, total micrograms of carbon monoxide and total hydrocarbons were reported.

Although many of the materials evaluated do not meet the standards shown in MSFC-SPEC-101B, maximums of 25 micrograms per gram sample of carbon monoxide and 100 micrograms per gram sample of total hydrocarbons (as pentane), judgment as to their use may depend on amounts and application of these materials planned use in the Workshop. Many materials evaluated in this program were not designed for use in a spacecraft habitation environment; therefore, failure of a material to meet the offgas requirement of MSFC-SPEC-101B is no reflection on a material or any manufacturer. Failure to meet MSFC-SPEC-101B only restricts the use of the material to spacecraft environments.

TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Aclar				0.3	13
Acoustoform, Type II				1.2	16.5
Adhesive, 64CP			Cured at 200°F for 16 Hours	1.7	<0.1
Adhesive, HT-424	SP/NTR 32		American Cyanimide	4.5	1.7
Adhesive, 55-9-100	SP/NTR 240		Chrysler Corporation	15	210
Adhesive, Crest 7343 Resin	SP/NTR 279			0.2	18
Adhesive, A-2 Epoxi	SP/NTR 242			0.4	61
Adhesive, EC 1838A/B	SP/NTR 223			5.1	22
Adhesive RL-4383 Over Chemlock 607	SP/NTR 292			1.0	98
Adhesive, Polyurethane RS-112	SP/NTR 259			<0.1	5.6
Adhesive, Moorhead 5144				0.1	1.8
Adhesive/Sealant, 3145 RTV			Dow Corning, Uncured	<0.1	1850
Adhesive SR-585	SP/NTR 235			<0.1	1.9
Adhesive/Sealant 3145 RTV			Dow Corning, Cured 72 Hours	<0.1	221
Adhesive, Silicone A-4000	SP/NTR 209			0.8	94
Aerobond 2119			Not Post Cured	1.8	142
Aerobond 2119		MMC/MDA 068	Post Cured	1.5	64
Alodine, Brush, Conversion Coating	SP/NTR 219			<0.1	810

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Alodine, Immersion, Coating Conversion	SP/NTR 221			<0.1	11
Anodize, Black PSI 123011	SP/NTR 206			9	18
Apiezon L Grease		MMC/MDA 117		0.2	<0.1
APCO 1263A/B	SP/NTR 208			<0.1	660
Armalon 408-123		FH-9		<0.1	0.3
Armstrong X-81		MMC/MDA 078		0.7	27
Ascarite, Asbestos/NaOH	SP/NTR 104		A. H. Thomas	<0.1	3.5
Asbestos, Teflon Impregnated			Adel Clamp No. 456	5.3	<0.1
Base C9-4193; H2-3561 Hardner		MMC/MDA 084		4.1	13
Beta Cloth, Coated with RL 3788 Fluorel	SP/NTR 320		Burlington	0.4	1.4
Bio-Rad AG50W-X12 K ⁺ Form		MD-40		1.2	1.8
Bis(4-heptal)3-methylglutarate				0.6	268
Braycote Micronic 631A, Batch B8LNI				0.3	0.2
Braided Wire Bundle, EJS-61-0866			Thickened with Undax 1000		
Braycoat Micronic Grease, 631A, Batch 38LNI	SP/NTR 42			Total - 134	Total - 11,760
Brush Alodine, PSI3204, Type II				<0.1	1.7
Bumper Sticker, NASA	SP/NTR 196			<0.1	680
				15	1300

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TABLE 1. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Buna N Elastomer Seal	SP/NTR 250		Press Cured for 60 Minutes at 289°F	<0.1	0.6
Buna N				1.4	4.0
Buna N Rubber	SP/NTR 59	MMC/MDA 114	MTL-P, Parker Seal Company	2.7	4.7
Cable, Triaxial			Raychem	<0.1	1.8
Cannon Connector, DB256-22-555N				0.6	0.6
Cannon Connector, small, PV6R16B26 SNS				0.3	0.1
Cat-L-Ink 50-110 White, Lot 20		MMC/MDA 26		5.4	2400
Cat-L-Ink 50-710		MMC/MDA 20B		0.3	2500
Cat-L-Ink 50-710		MMC/MDA 20A		7.8	1100
Cepox 510 Silver				24	160
Cetyl Alcohol, 10%, in Ethanol				12	<0.1
Clamp, 9M-145			Fiberglass Covered	8.5	16
Cloth RL-355	SP/NTR 9		Raybestos Manhattan	0.4	17
Cloth, Silicone Impregnated, SRC-0607		MMC/MDA 120		<0.1	2.0
Coating 2406				4.2	0.6
Coating 812				8.3	0.4
Coating 2306				1.2	0.1

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Coatings 2396 and 811B2				1.6	5.2
Coating ILOX88				1.6	<0.1
Coating, Inlox 44				1.0	6.4
Coating, Everlox 18				3.6	53
Coating, Fire Retardant, Alki 107A				0.8	330
Coating, Retardant, Alki 107 X Exterior				0.2	220
Coating, 92-007 Thermal Control				0.5	9.6
Coating, X-81		MMC/MDA 078A		17	113
Coating, Viscous, Nylok VC-3		MMC/MDA 082		15	470
Coating, C4-W		MMC/MDA 099		3.3	67
Coolanol 15				12	2550
Coolanol 15				2.5	1170
Component MDV P/N 61A800079-29-02			Average of 4 Samples	78/in ²	265/in ²
Convolex Tubing, NBG	SP/NTR 157		Painted with Velvet Coat	2.6	4.3
Coolant MES 198, Liquid			Raychem	<0.1	299
CPR 20-3		MD-49	Upjohn Company	0.5	32
CPR 201-2		MD-46	Upjohn Company	1.7	76
CPR 201-6		MD-47	Upjohn Company	0.8	142

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TABLE 1. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
CPR 201-4		MD-48	Upjohn Company	1.1	134
CPR-2018		MD-50	Upjohn Company	1.1	2.0
CPR 2036		MD-51	Upjohn Company	1.3	2.0
Cyclemeld 55-9-100		FH-11		<0.1	122
DC-2104, Fabric, Resin Impregnated	SP/NTR 173			<0.1	7.6
DC-3145 RTV	SP/NTR 159		Dow Corning	0.1	15
Dodge 387-6				<0.1	0.4
Drierite, Water Absorber	SP/NTR 103			<0.1	2.8
Drifilm	SP/NTR 85		General Electric	<0.1	435
Drilube 82 Lubricant	SP/NTR 255			<0.1	293
Drilube, Type 882, MMS N306A				12	<0.1
Drilube 701 Lubricant	SP/NTR 263			<0.1	22
Dynaflex			Apollo 14 Flyby	0.3	0.4
EC 847 Adhesive				8.5	3750
EC 1663 Over PR-1906 Primer	SP/NTR 27		3M Company	0.1	9.9
EC 1663/PR 1906/on WOSN3312621	SP/NTR 178			0.2	23
Eccoshield VY Compound	SP/NTR 174			0.2	1.9
Electrical Plug PT06CP-10-65	SP/NTR 136			0.8	18

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μ R PER g SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Electrical Receptacle, PT02H-10-6P	SP/NTR 166		Bendix	<0.1	<0.1
Electrical Receptacle	SP/NTR 195			13	4200
Electrical Insulation, Polythermalize 2000	SP/NTR 280			7.2	16
Electrical Insulation, Ben Har 115	SP/NTR 281			0.1	1.1
Electro Film 2396	SP/NTR 82		Electrofilm, Inc.	2.1	10.1
Emerlon 323			Cured at Room Temperature for 2 Hours and at 150°F for 30 Minutes	33	1925
Emerlon 323			Dried at Room Temperature for 2 Hours and at 150°F for 30 Minutes	51	1360
Enamel, Desota 521-002	SP/NTR 318			470	40,000
Epon VIII Curing Agent A	SP/NTR 30			2.3	195
Epon 828, 85-334-11				22	12
Epon VI/DTA, A50	SP/NTR 143			2.8	33
Epon IX, Type V	SP/NTR 168		Shell Chem.	3.0	2.0
Epoxi Black Paint, Fuller Paint 7223				0.9	488
Epoxi Fiberglass Laminate	SP/NTR 248			0.2	0.8
Epoxi A-2A		FH-12		0.4	34
Epoxi Coating	SP/NTR 243			3.4	440

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, LB PER 8 SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Epoxi 1169	SP/NTR 77		Dennis Chemical Company	6	7,250
Epoxi Coating, 529-004 Enamel	SP/NTR 34			109	10,900
Epoxi Coating, Finch Cat-A-Lac			Cured at Room Temperature, 1 foot ²	Total - 54	2
Epoxi Adhesive, A-1 Actuator E	SP/NTR 197			1.3	240
Epoxi Coating, Finch Cat-A-Lac			Cured at 200°C, 1 foot ²	Total - 75.1	Total - 15.1
Epoxi Ester Coating	SP/NTR 260			22	80
Epoxi-Polyurethane EMS-369 Co-Polymer	SP/NTR 86			0.8	1.5
Epoxi Paint	SP/NTR 246			46	4300
Epoxi Paint, Fuller Paint 7221, White				0.3	593
Epoxylite 810, A-43				1.2	14
Epoxylite 9653				<0.1	120
Ergometer Seat				Total - 974	<0.1
Ergometer Seat Spring				<0.1	<0.1
Felt, S.A.E. Spec F-50	SP/NTR 161		Lion Precision, Inc.	2.9	3.5
Fiberglass Spinsulation	SP/NTR 53		Johns Manville	<0.1	7.6
Fiberglass, BH Acrylic "C"	SP/NTR 249			<0.1	3.7
Flame Sprayed Potted Module, Type 4 (NDAC)				Total - 41	Total - 1200

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TABLE I. OFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Flamecore, Tubing				0.4	0.8
Fluorolube LG-160	SP/NTR 80		Hooker Chemical Company	<0.1	1.0
Fluorolube MG-600	SP/NTR 66			<0.1	6.0
Fluorel, L-3251 R-M				1.4	1.2
Fluorel 1077 S-151 (Lot 675)			Mosite Rubber Company	0.3	0.5
Fluorel RL-3788	SP/NTR 283			1.3	12
Fluorocarbon Elastomer Seal	SP/NTR 252			0.2	0.4
Fluorinert, Electronic Liquid FC-75			3M Company	<0.1	4800
Fluoroelastomer Seal O-Ring	SP/NTR 253			<0.1	0.8
Fluorosilicone Rubber, I-608-6	SP/NTR 60		Parker Seal Company	<0.1	0.9
Fluorosilicone, FS-1281 Compound			Dow Corning	<0.1	<0.1
FM-34 on Pyraline		MMC/MDA 097		0.6	1.4
Foam, 3-D			With Aluminum on One Side	0.2	7.1
Foam, 3-D			Covered with Aluminum Foil	<0.1	4.5
Foam Adhesive, FM-37	SP/NTR 67			4.1	8.6
Freon E-2				<0.1	2700
FRL Style S-111				<0.1	8.6
Gasket, RF Silicone and Monel Metal Gasket		MMC/MDA 062		<0.1	0.4

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Gasket (Cotton Base)	SP/NTR 254		Red Forben Fiber	0.6	1.3
Glass, Silicone Impregnated	SP/NTR 193			<0.1	35
Grease, Andoc C	SP/NTR 36			2.4	130
Grease, Apieson N				0.6	<0.1
Glyptal 1276				113	3625
Glyptal 2010156				163	6800
H-Cement				<0.1	<0.1
Hypalon Seal EMS 355	SP/NTR 251			<0.1	9.5
Impulse Precision Sound Meter			Bruel Kijler Company	Total - 310	Total - 5700
Indicating Light, Miniature			Grimes Manufacturing Company	0.7	1.0
Ink, Black 1448	SP/NTR 35		Banner Rubber Stamp Company	188	20
Ink, 5-100, Black	SP/NTR 114		Organic Products	<0.1	4400
Ink, Black IXF 6831	SP/NTR 190			13	1.1
Ink, 73X Black	SP/NTR 239			13	111
Ink, Alkamatic White	SP/NTR 245			<0.1	100
Ink, Green F-100	SP/NTR 117		Organic Products	<0.1	2300
Ink, 1448 White	SP/NTR 241			8.4	18
Ink, VF-200 Red	SP/NTR 115		Organic Products	<0.1	3400

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μ R PER g SAMPLE	
	SP/NTR	NO.		CARBON MONOXIDE	TOTAL HYDROCARBONS
Ink, Silver 73X	SP/NTR 191			47	39
Ink, Silver F-100	SP/NTR 116		Organic Products	<0.1	3500
Ink, 1448 Silver	SP/NTR 28		Banner Rubber Stamp Company	0.7	9.3
Ink, White 73X	SP/NTR 244			3.5	44
Kapton, Type F, 300F021			DuPont	<0.1	18
Kel-F				0.3	0.7
Kel-F 800				3.2	4000
Kel-F No. 90 Grease				<0.1	46
Kel-F 800 Coating				4.9	<0.1
Kel-F 800			Cured at 160° F	4.6	43
Kel-F 800			Cured at Room Temperature for 24 Hours; 24 Hours at 160° F	0.6	11
Kynar Heat Shrinkable Tubing	SP/NTR 17		Raychem	1.3	3.6
Krytox 143AZ			DuPont	<0.1	1.0
Krytox 280AB				<0.1	1.7
L3236 Style 3766-3				0.4	5.6
Laminar X-500, Black	SP/NTR 181		Cured 41 Days at Room Temp.	0.5	2250
Laminar X-500, Black, Flat			30 Hours Cure at 200° F	2.2	12
Laminar X-500, Black, Semigloss, 018B			30 Hours Cure at 200° F	<0.1	18

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Laminar X-500, Blue, Martin-Denver		024	Cured 30 Hours at 200°F	3.0	1.0
Laminar X-500, Clear, Martin-Denver		017A	Cured 30 Hours at 200°F	<0.1	35
Laminar X-500, Gray, Martin-Denver		016A	Cured 30 Hours at 200°F	<0.1	71
Laminar X-500, Red, Martin-Denver		019A	Cured 30 Hours at 200°F	<0.1	8.2
Laminar X-500, Red	SP/NTR 270			1.2	2600
Laminar X-500, White	SP/NTR 113			1.5	163
Laminar X-500, White, Spec. C			Martin Co., Cured at 200°F	<0.1	134
Laminar X-500, White, Spec. A			Martin Co., Cured 96 Hours at 110°F	<0.1	1700
Laminar X-500, White, Spec. C			Martin Co., Cured 96 Hours at 110°F	<0.1	1700
Laminar X-500, 4W-80/10-C-158	SP/NTR 171			<0.1	1900
Laminar X-500, White	SP/NTR 186		Cured 30 Days at Room Temp.	4.2	1650
Laminar X-500, White	SP/NTR 188		Cured 1 Hour at 325°F	1.2	7.5
Laminar X-500, White			Room Temperature Cure for 5 Day	<0.1	2350
Laminar X-500, White	SP/NTR 188		Cured at 120°F	<0.1	2.2
Laminar X-500, White			Cured at 155°F	<0.1	160
Laminar X-500, White			Cured 24 Hours Vacuum	<0.1	3900
Laminar X-500, White			Cured 24 Hours Vacuum at 110°F		3950

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, PER CARBON MONOXIDE	PER SAMPLE TOTAL HYDROCARBONS
	SP/NTR	NO. OTHER			
Laminar X-500, White	SP/NTR 194		Room Temperature Cure for 64 Days	<0.1	3500
Laminar X-500, White			Room Temperature Cure at MSFC	<0.1	3040
Laminar X-500, White			Cured at 155°F	<0.1	55
Laminar X-500, White			Cured at 155°F	<0.1	29
Laminar X-500, White			Cured at Room Temperature Tested at 120°F	<0.1	1000
Laminar X-500, White	SP/NTR 187		Cured at Room Temperature for 30 Days	<0.1	1250
Laminar X-500, White	SP/NTR 198		Cured at Room Temperature for 13 Days	<0.1	2250
Laminar X-500, White			Cured in Moving Air at 155°F	<0.1	1200
Laminar X-500, White			Cured 4 Days at 120°F	<0.1	440
Laminar X-500, White			Cured 4 Days in Moving Air at 155°F	<0.1	490
Laminar X-500, White			Cured at 155°F for 4 Days	<0.1	1300
Laminar X-500, White			Cured in Moving Air at 155°F	140	104
Laminar X-500, White			Cured 1 Day at 155°F, Tested at 120°F	-	300
Laminar X-500, White, Martin-Denver		020A	Cured 30 Hours at 200°F	<0.1	47
Laminar X-500, Off-White, Martin-Denver		022B	Cured 30 Hours at 200°F	<0.1	35

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Laminar X-500, White, Martin-Denver		025A	Tested at 94°F Cured for 4 Days at Room Temperature with Moving Air, Tested at 94°F Cured 4 Days at Room Temperature with Moving Air, Tested at 120°F Cured 2 Days at Room Temperature Cured 7 Days in Moving Air Cured 67 Days, and 3 Days Moving Air	1.0	5.3
Laminar X-500, White, Martin-Denver		026A		2.0	4.2
Laminar X-500, White				<0.1	94
Laminar X-500, White				231	240
Laminar X-500, White				232	1040
Laminar X-500, White	SP/NTR 232			-	140
Laminar X-500, White	SP/NTR 231			-	200
Laminar X-500, White	SP/NTR 194			-	29
Laminar X-500, White Over Velvet Coat	SP/NTR 139			1.6	1290
Laminar X-500, Yellow, 4-Y-43 Resin 10-C-158	SP/NTR 140			0.7	1970
Laminar X-500, Yellow	SP/NTR 140			<0.1	2200
Laminar X-500, Org. Yellow, Martin-Den.		023A		<0.1	10
Laminar X-500, Lt. Yellow, Martin-Den.		021A		<0.1	32
Laminar X-500, Over RL-3788 Fluorel	SP/NTR 192			1.8	6000
Laminar X-500 Over RL-3788 Fluorel	SP/NTR 207			0.2	83

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, HG PER G SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Laminar X-500, Yellow	SP/NTR 180		Cured 15 Days at Room Temperature	0.8	2175
Laminated Aluminum Cardboard Box					
Latex, Donahue			Cured at Room Temperature	2.4	1.4
Latex, Donahue			Cured at 160°F for 16 Days	4.0	0.3
Latex, Gleem			Cured at Room Temperature	2.6	13
Latex, Napko			Cured at Room Temperature	2.5	1.5
Latex, Napko			Cured at 160°F for 16 Hours	8.9	3.7
Latex, Gleem			Cured at Room Temperature	33	45
Latex, Sears			Cured at 160°F for 16 Hours	2.4	0.8
Latex, Sherwin-Williams			Cured at 160°F for 16 Hours	8.9	3.7
Latex, Sears			Cured at 160°F for 16 Hours	324	36
Latex, Wards			Cured at Room Temperature	6.4	6.6
Latex, Wards			Cured at Room Temperature	3.4	8.7
Latex, 100% Sherwin-Williams			Cured at 160°F for 16 Hours	3.1	5.2
Lauric Acid			Cured at Room Temperature	553	24
Lacquer, Black, 032 Airteck			Andrew Brown	4.1	<0.1
Lexan				7.0	290
Lubricant, Dry Film No. 811B				0.2	<0.1
				2.3	<0.1

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TABLE I. OFPGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	NO OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Lubricant, MLR-2		MMC/MDA 083		<0.1	5.8
Lug, Vinyl Insulated		MMC/MDA 050		<0.1	7.0
Magnehelic Gauge, Body Only			F. W. Dwyer Mfg. Co.	Total - 213	Total - 96
Magnehelic Gauge Dial			F. W. Dwyer Mfg. Co.	0.5	<0.1
Magnehelic Gauge Diaphragm			F. W. Dwyer Mfg. Co.	4.4	<0.1
Magnehelic Gauge, Without Diaphragm			F. W. Dwyer Mfg. Co.	Total - 345	Total - 69
Magnehelic Gauge Magnet			F. W. Dwyer Mfg. Co.	1.4	<0.1
Magnehelic Gauge Diaphragm, Silicone			F. W. Dwyer Mfg. Co.	1.4	2.0
Magnehelic Gauge			F. W. Dwyer Mfg. Co.	Total - 775	Total - 109
Magna Polyurethane			Midland Coating, Room Temperature Cure	1.1	<0.1
Mallory, Sonalert 2C628				1.7	131
Magic Marker				<0.1	27
Marking Foil, K-36 Black Wire	SP/NTR 220			67	83
Micaply EG818T, Type FL-CF	SP/NTR 81		Mica Corporation	<0.1	0.4
Micatex No. 36231				11	23
Micatex, Blue, New				0.8	11
Micatex, Blue, Old				0.9	13
Micatex Paint, White				4.6	235

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Micatex Paint, White			48 Hour Cure at 160°F and Vacuum	2.3	3.8
Micatex Paint, White			48 Hour Cure at 160°F	2.9	5.9
Micatex Paint			Cured at Room Temperature	3.3	32
Monel Staples 508 1/4 C + Tape		MMC/MDA 119		Total - 4.0	Total - 290
Napco Foam CA-620	SP/NTR 118			0.9	3.0
Neoprene, Press			Cured for 30 Minutes at 302°F	1.7	0.7
Nextel, 3M			Cured at 180°C	Total - 16	Total - 977
Nextel, 3M Coating			Cured at Room Temperature, 1 Foot ²	Total - 31	Total - 15,276
Nextel, 3M Coating			Cured at 200°C, 1 Foot ²	Total - 28	Total - 16
Nituff Teflon Coating	SP/NTR 264			<0.1	4.7
Nomex 410 Paper	SP/NTR 95		With NCR Thermal Coat	2.6	5.2
Nomex, Aromatic Polyimide				3.3	7.7
Napco Foam	SP/NTR 182		Cured 2 Hours at 200°F	<0.1	0.9
Nuclear Emulsion			From Naval Research Labs.	124	2000
Nylon				1.9	0.2
Nylon, Glass Fiberfilled	SP/NTR 164		Cosmo Plastic Co.	3.0	2.3
Oxylube 702	SP/NTR 108		Drilube Co.	<0.1	9.1

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Paint, Albi Fire Retardant			Xylene and X99	0.2	130
Paint, Cat-A-Lac White			16 Hours Room Temperature, 1 Hour 150°F, and 24 Hours at 200°F	4.0	1200
Paint, Cat-A-Lac White			16 Hours Room Temperature, 1 Hour 150°C with Vacuum, 38 Hours at 200°F	0.8	12
Paint, Cat-A-Lac White				13	5000
Paint, Cat-A-Lac Gray				36	11,000
Paint, Cat-A-Lac White				2.3	3900
Paint, Cat-A-Lac White, Overcoated With Kel-F 800			16 Hour Room Temperature, 1 Hour 150°C with Vacuum, 38 Hours at 200°F	0.8	970
Paint, Cat-A-Lac White			16 Hours Room Temperature, 1 Hour 150°F, 24 Hours 200°F, 53 Hours 200°F in Vacuum	3.1	19
Paint, Cat-A-Lac White	16		16 Hours Room Temperature, 1 Hour 150°F, 24 Hours 200°F, 38 Hours 200°F Vacuum	-	35
Paint, Cat-A-Lac Gray			16 Hours Room Temperature, 1 Hour 150°F, 24 Hours 200°F, 38 Hours 200°F Vacuum	-	24
Paint, Cat-A-Lac Orange			Cured 16 Hours Room Temperature 1 Hour 150°F, and 24 Hours at 200°F	2.9	29

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Paint, Cat-A-Lac Blue, Alodined			Cured 16 Hours Room Temperature 1 Hour 150°F, and 24 Hours at 200°F	5.5	19
Paint, Cat-A-Lac, Green, Alodined			Cured 16 Hours Room Temperature 1 Hour 150°F, and 24 Hours at 200°F	5.4	11
Paint, Cat-A-Lac, Black			Cured 15 Hours Room Temperature 1 Hour 150°F, and 24 Hours at 200°F	6.3	15
Paint, Cat-A-Lac, Green 463-6-3			Epoxi Primer	44	1630
Paint, Cat-A-Lac, Gray			16 Hours Room Temperature, 1 Hour 150°C with Vacuum, 38 Hours at 200°F	0.7	8.4
Paint, Blue	SP/NTR 45		Andrew Brown, XA-244	36	4500
Paint	SP/NTR 68		Andrew Brown XA-237 Green	1.2	550
Paint, 92007			Dow Corning	0.7	30
Paint, Polytherm 710 Black				<0.1	24
Paint, EC 1981	SP/NTR 64		3M Company	1.2	3200
Paint, XA203 Black	SP/NTR 62		Andrew Brown Company	4.7	209
Paint, Gray	SP/NTR 43		Andrew Brown Company XA-194	1.7	3750
Paint, S-13G				0.2	220
Paint, EC 1252 White				<0.1	130
Paint, Uniglaze, White C-1204				1.8	6.5

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TABLE 1. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, HR PER 8 SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Paint, Dow Corning 92-007	SP/NTR 247	MMC/MDA 079	Andrew Brown	0.4	120
Paint, Epoxi				51	500
Paint, External Vinyl				3.4	1600
Paint, Epoxylite 9653 Over FR-43				<0.1	77
Paint, Finch Black Epoxy 463-3-8				10	12,700
Paint, Finish Black				3150	4600
Paint, TR 400				Total - 5.8	Total - 28
Paint, 521-002, White, Epoxi Over 515-003 Yellow Epoxi				9.0	15,000
Paint, White, 10M10833				1.6	1500
Paint, White, 10M10833				4.4	2100
Paint, Uniglaze, Black C-1336	SP/NTR 247	MMC/MDA 079	Desoto	8.1	24
Paint, Polytherm R-100 White				<0.1	320
Paint, Panel D-2				<0.1	52/in ²
Paint, Panel D-3				4.1/in ²	26/in ²
Paint, Panel D-4				8.4/in ²	38/in ²
Paint, Panel D-1				<0.1	34/in ²
				1 Square Inch of Printed Paint For Electronic Parts	
				1 Square Inch of Printed Paint For Electronic Parts	
				1 Square Inch of Printed Paint For Electronic Parts	
				1 Square Inch of Printed Paint for Electronic Parts	

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TABLE 1. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Paint, Panel C-3			1 Square Inch of Printed Paint for Electronic Parts	<0.1	<0.1
Paint, Panel C-4			1 Square Inch of Printed Paint for Electronic Parts	<0.1	<0.1
Paint, Panel C-2			1 Square Inch of Printed Paint for Electronic Parts	2/in ²	<0.1
Paint, Panel A-3 (Epoxi Substrate)				20/in ²	<0.1
Paint, Panel A-1 (Epoxi Substrate)				14/in ²	<0.1
Paint, Panel A-4 (Epoxi Substrate)				34/in ²	<0.1
Paper, Nomex 410, NCR	SP/NTR 147			3.4	28
Paper, Nomex 410, NCR	SP/NTR 148			4.3	24
Paper, Nomex 410, NCR	SP/NTR 149			6.3	21
Paper, Nomex	SP/NTR 151		Standard NCR	7.4	4.0
Paper, Nomex	SP/NTR 153		Standard NCR	5.8	9.0
Paper, Nomex	SP/NTR 154		Standard NCR	13	5.2
Paper, Nomex	SP/NTR 169		Standard 410, NCR	5.3	11
Paper Roll, NCR	SP/NTR 150			13	
Paper Board, IC-1003		MMC/MDA 085	Intercel Corporation	18	9.5
Paper Board, C7-4248		MMC/MDA 085	Hysol Division, Dexter	0.1	43
Paper, Nomex 410			Coated with Page Printer Mod. with CaCO ₃	3.1	76

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μ R PER 8 SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Paper, Nomex, Uncoated				1.3	4.7
PBI Cloth				3.8	11
Phenolic-Fiberglass FF-34	SP/NTR 83		Formica Corporation	1.5	31
Phenolic-Fiberglass Laminate	SP/NTR 160			7.2	2.9
Phenolic Paper, Laminated PRG	SP/NTR 125			2.9	37
Plastic Rod	SP/NTR 70		MIL-P-79 FBG	0.4	23
Plastic, Thermosetting, L-P-509	SP/NTR 276			1.2	54
Plastic, FM 96		MMC/MDA 062		<0.1	0.4
Plugs, Sealing, Glass-Filled Epoxi		MMC/MDA 104		3.0	<0.1
Polycast Acrylic 101				47	24
Polyethylene Tape Y9085	SP/NTR 110		3M Company	1.8	14
Polyimide Foam R-1-72710				0.6	0.5
Polyolefin, RNF 100 Thermofit	SP/NTR #19			0.9	3.0
Polyolefin, Shrink Cap	SP/NTR 16		Rayclad	0.8	4.0
Polyolefin, Modified, Melttable Tubing	SP/NTR 18		Rayclad	1.2	1.3
Polyolefin, Heat Shrinkable Tubing	SP/NTR 21			5.1	7.1
Polyurethane, 3-D Foam				0.7	7.5
Polyurethane Coating			Midland Laminar X-500 Cured at 200°C, 1 Foot ²	Total - 12	Total - 9.5

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Polyurethane Coating			Midland Laminar X-500, Cured at Room Temperature, per ft ²	Total - 18	Total - 528
Polyurethane Coating, Laminar X-500			Cured 24 Hours at 110°F, Under Vacuum	3.8	29
Polyurethane Foam			Upjohn Company	0.3	2300
Polyurethane Foam, CPR-201-2			Cured 24 Hours at 150°F	0.2	1390
Polyurethane Foam, Laminar X-500			Cured 4 Hours at 200°F	1.6	85
Polyurethane Foam, Laminar X-500			Cured 1 Hour at 200°F	<0.1	31
Polyurethane Foam, Laminar X-500			Cured 4 Days at 110°F	<0.1	31
Polyurethane Clear Paint, Laminar X-500			Midland Dexter Company	10	255
Printer Paper, NCR Military	SP/NTR 272			<0.1	31
Primer, RTV 630, SS 4120				0.6	3.7
Primer, Metal Etch				<0.1	3.9
Primer, BR123, FM-123-2	SP/NTR 69		Aerteck	2.1	350
PS14032 Filler Compound, Type I	SP/NTR 142			0.9	49
Pyralin Polyamide				3.3	8.5
				5.5	12

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TABLE I. OFPGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS(Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, µg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
RA 38360 SI				0.5	<0.1
RA 39260 SI				0.3	<0.1
RA 26360 VA				0.9	<0.1
RA 24160 ONE				4.8	<0.1
RA 36660 OEP				9.1	5.7
Refset Cement (20% Solids) RL-3788				5.4	6.1
Receptacle, Electrical, PTOOP-21A				0.3	18
Refset, L3682-3	SP/NTR 137		Cured 4 Hours at 20°F after 24 Hours Room Temperature	4.5	<0.1
Refset Cement RL-3788			6 Day Test	4.3	<0.1
Refrigerant Tubing Seal and Front Panel Seal, Food Freezer		MD-63	IT 424-698-1	Total - 174	Total - 1250
Refrigerant Tubing Seal, Front Panel Seal, Food Freezer		MD-72	IT 426-698-501	Total - 309	Total 924
Resin, 7-C-42 with 10-C-160 Hardner			Dexter Corporation	<0.1	610
Resin, Kish 412M	SP/NTR 297			0.3	2.0
Rivets,		MMC/MDA 21	Cherrylock	<0.1	<0.1
RL-3550 Over Aluminum	SP/NTR 101		Raybestos-Manhattan	1.5	6.8
RL-3550 Over DC-3145 and EC-1663	SP/NTR 138			1.9	375
RL-3550 Over EC-1663, Process III	SP/NTR 106			1.8	27

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
RL-3550 Over EC-1663, Process IV	SP/NTR 107			1.8	495
RL-3452, Sheet				1.0	9.7
RTV 11/Thermolite 12 Over SS 4004 Primer	SP/NTR 84			<0.1	26
RTV-602, G.E. Batch 228, 4% SRC-05 Catalyst				<0.1	292
RTV-602, G.E. Batch 228, 4% SRC-05 (Vacuum Stripped)				<0.1	295
RTV-3111, Cat "S" 15%				0.1	27
Rubber, RTV-20		MMC/MDA 096		<0.1	40
Rubber, 90-031 Base, 90-031-2 Cat		MMC/MDA 063		0.1	21
Rubber, Ethylene Propylene, X-147-W-1		MMC/MDA 093		0.3	38
Rubber, Cohrlastic 500 Silicone		MMC/MDA 051		<0.1	1.0
Rubber Inserts, 10-10196	SP/NTR 135		Protection Caps Neoprene	<0.1	13
Rubber, Buna-N 8279	SP/NTR 39			4.4	7.3
Rubber, Nitrile N-304-70	SP/NTR 57		Parker Seal Company	6.4	9.4
Saureisen 29			Contract H-81700-A	<0.1	<0.1
Saureisen Adhesive Cement				<0.1	<0.1
Scotch-Grip 77	SP/NTR 225			54	620
Scotchcal Labels			Reported as Amount per in^2	0.9	270

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TABLE 1. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER $\frac{1}{2}$ INCH	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Scotchcal Pressure Sensitive Adhesive			Attached to Aluminum	3.5/sq inch	145 sq. inch
Seal, EMS 93001, Compound Silicone	SP/NTR 278			0.1	3.3
Sealant, Polysulfide, 890-B2	SP/NTR 227			9.0	110
Seal, 910-C-10934		MMC/MDA 088	Primer and Adhesive	0.1	58
Sealant, General, 210				0.2	1.1
Sealant, General, 43				0.1	1.8
S-13G, Batch 128			With Primer	0.2	29
S-13G, Batch 128			Without Primer	0.1	21
Silicone DC-9-102	SP/NTR 109		Rubber Sealant over DC 4094 Primer	1.2	47
Silicone Rubber				<0.1	5.5
Silastic 69-210	SP/NTR 126		Silicone Rubber over A 4090 Primer	<0.1	53
Silastic 675		MMC/MDA 074		<0.1	0.3
Silastic 675		MMC/MDA 086		<0.1	0.8
Silicone Rubber, Silastic 651	SP/NTR 33			<0.1	0.2
Silicone Rubber, S-2097, 24-480	SP/NTR 37			<0.1	0.6
Silicone Rubber, DC 6508	SP/NTR 40			0.3	1.7
Silicone Rubber, 11715	SP/NTR 41			0.3	90

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Silicone Rubber, S-656-5	SP/NTR 58		Parker Seal Company	0.1	0.9
Silicone Rubber, S-455-7	SP/NTR 61		Parker Seal Company	<0.1	0.3
Silicone Rubber #863	SP/NTR 24			<0.1	19
Silicone Rubber	SP/NTR 31		Stillman Rubber Company	1.9	14
Silicone Rubber with Glass Fiber, Type I	SP/NTR 15			0.5	<0.1
Silicone Rubber			Press Cured 20 minutes at 238°F, Oven Cured at 450°F for 16 Hours	0.2	0.4
Silicone Seal EMS53015	SP/NTR 298			<0.1	230
Silicone Compound 3041-003X	SP/NTR 308			0.3	1.7
Silicone Sealant	SP/NTR 172		Dow Corning	32	10
Silicone, RTV 90, with L24			Prepared by MSFC	<0.1	550
Silicone, RTV 90, with Thermolite 12				<0.1	205
Silicure L24, RTV 90	SP/NTR 71			0.1	24
Sodium Silicate	SP/NTR 238			0.5	13
Solder Sleeves, D103-00 Kynar	SP/NTR 20		Rayclad	6.5	4.6
Spacer, NAS43DD	SP/NTR 309			0.1	22
Spray, Rulon		MMC/MDA 055		<0.1	34
Stycast 2651-TC				<0.1	0.3

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, $\mu\text{g PER g SAMPLE}$	
	SP/NTR	NO. OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Switch, Electrical Toggle		MMC/MDA 057	American Oil Company	<0.1	36
Supernil ASU 06752				1.7	7.7
Sylgard 184, Potting Resin	SP/NTR 165		Dow Corning	<0.1	62
Tank Wall Specimen Insulation, OWS				0.2	11
Tape, 7110			3M Company	1.3	18
Tape, 7610			3M Company	<0.1	29
Tape, Aluminized Mylar Y9360		MMC/MDA 066		<0.1	3.9
Tape, Scotch 410	SP/NTR 121		3M Company	0.8	3.9
Tape, Scotch Brand, Y9241 NEH 0296A				8.0	21
Tape, Scotch Brand, No. 666, Pressure Sensitive				0.8	43
Tape, Fluorolin		MMC/MDA 112	Jockin Manufacturing Company	<0.1	2.0
Tape, Permacel EE-6379		MMC/MDA 113		19	44
Teflon, Glass Impregnated			Adel Clamp No. 492	2.2	1.6
Teflon Tape, E-235-2	SP/NTR 214			<0.1	9.5
Textolite 11635		MMC/MDA 077		0.3	3.7
TFE Coat Formula 2000	SP/NTR 302			<0.1	61
Thermal Compound #128				0.2	6.7
Thermofit NBG			Raychem	0.6	0.7

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TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Continued)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μ R PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Thermolite 12, RTV 90, Over Stainless Steel 4004 Primer	SP/NTR 48		General Electric	0.1	6.8
Tissue, Facial				6.0	0.6
Toggle Switch 8906K1244, P/N 52-7970561	SP/NTR 145			0.3	2.2
Tubing L2231			R. L. Darling Company	2.2	10
Tubing, Glass, NPG Coated		MMC/MDA 059		0.2	0.9
Varglas Class H.A.I. (SR), Size 15	SP/NTR 146			480	11
Varnish, Alkyd Resin Spar	SP/NTR 277			1400	980
Velvet Coat 401-A-10	SP/NTR 65		MEK Thinned	2.3	44
Vespel, Polymer SP-1			E. I. DuPont	3.2	0.2
Viton, FR, 238-26-1, Sheet			E. I. DuPont	0.5	235
Viton, FR, 238-26-1			E. I. DuPont	0.4	126
Viton, FR-238-26-1			E. I. DuPont (9 day test)	0.3	54
Webbing, Fiberglass	SP/NTR 261			0.1	0.3
Wire Harness 82, TFE Coated				<0.1	8.3
Wire Insulation (FEP Polyimide Coated, ITT)				0.4	0.6
White Paint, KA-213	SP/NTR 63		Andrew Brown	1.7	36,500

S&E-ASTN-OT-25 (July 1972)

TABLE I. OFFGAS ANALYSES OF VARIOUS NON-METALLIC MATERIALS (Concluded)

MATERIAL	IDENTIFICATION		REMARKS	ANALYSIS, μg PER g SAMPLE	
	SP/NTR	OTHER		CARBON MONOXIDE	TOTAL HYDROCARBONS
Zinc Chromate			Applied March 1965	40	12
Zinc Chromate Primer			Second 3-Day Test	28	8.4
Zinc Chromate Primer, Yellow			9 Day Test	25	7.0
Zinc Chromate Primer, Yellow				329	347

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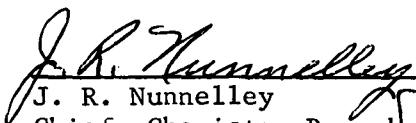
APPROVAL

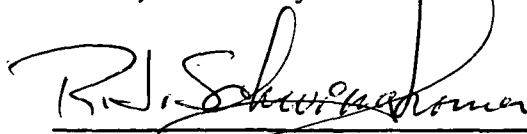
OFFGASSING OF NON-METALLIC MATERIALS IN 5 PSIA OXYGEN

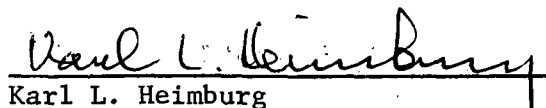
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F. T. Wells and D. R. Hamilton

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J. R. Nunnelley
Chief, Chemistry Branch


R. J. Schwinghamer
Chief, Materials Division


Karl L. Heimburg
Director, Astronautics Laboratory

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